# 13 HP
# ENGINE MANUAL
## SET UP, OPERATING, AND SERVICING INSTRUCTIONS

**⚠ DANGER**

**Using an engine indoors CAN KILL YOU IN MINUTES.**

**Engine exhaust contains carbon monoxide. This is a poison you cannot see or smell.**

**NEVER use inside a home or garage, EVEN IF doors and windows are open.**

**Only use OUTSIDE and far away from windows, doors, and vents.**

**Distributed exclusively by Harbor Freight Tools®.**

3491 Mission Oaks Blvd., Camarillo, CA 93012

**Visit our website at: http://www.harborfreight.com**

**Read this material before using this product. Failure to do so can result in serious injury. SAVE THIS MANUAL.**

Copyright© 2009 by Harbor Freight Tools®. All rights reserved. No portion of this manual or any artwork contained herein may be reproduced in any shape or form without the express written consent of Harbor Freight Tools. Diagrams within this manual may not be drawn proportionally. Due to continuing improvements, actual product may differ slightly from the product described herein.

**For technical questions or replacement parts, please call 1-800-444-3353.**

# CONTENTS


IMPORTANT SAFETY INFORMATION ..... 3

TECHNICAL SPECIFICATIONS ... 7

UNPACKING ..... 7

SET UP INSTRUCTIONS..... 8

OPERATING INSTRUCTIONS ..... 8

- PRIMARY ENGINE COMPONENTS . 8
- PRE-START CHECKS..... 9
- STARTING THE ENGINE ..... 10
- CHARGING SYSTEM CIRCUIT PROTECTOR..... 11
- TO STOP THE ENGINE..... 11

SERVICING..... 12

- MAINTENANCE PROCEDURES .... 12
- CLEANING, MAINTENANCE, AND LUBRICATION SCHEDULE ..... 13
- STORAGE ..... 14
- TROUBLESHOOTING..... 16

PARTS LIST..... 18

ASSEMBLY DIAGRAM..... 20

LIMITED 90 DAY WARRANTY ... 21

EMISSION CONTROL SYSTEM WARRANTY ..... 21

## SAVE THIS MANUAL

Keep this manual for the safety warnings and precautions, assembly, operating, inspection, maintenance and cleaning procedures. Write the product's serial number in the back of the manual near the assembly diagram (or month and year of purchase if product has no number). Keep this manual and the receipt in a safe and dry place for future reference.

# IMPORTANT SAFETY INFORMATION

**In this manual, on the labeling, and all other information provided with this product:**

**This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.**

**⚠DANGER** **DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.**

**⚠WARNING** **WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.**

**⚠CAUTION** **CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.**

***NOTICE*** **NOTICE is used to address practices not related to personal injury.**

**CAUTION** **CAUTION, without the safety alert symbol, is used to address practices not related to personal injury.**

**WARNING! Read all instructions. Failure to follow all instructions listed below may result in fire, serious injury and/or DEATH.** The warnings and precautions discussed in this manual cannot cover all possible conditions and situations that may occur. It must be understood by the operator that common sense and caution are factors which cannot be built into this product, but must be supplied by the operator.

**SAVE THESE INSTRUCTIONS**

## SET UP PRECAUTIONS

1. Gasoline fuel and fumes are flammable, and potentially explosive. Use proper fuel storage and handling procedures. Do not store fuel or other flammable materials nearby.
2. Have multiple ABC class fire extinguishers nearby.
3. Operation of this equipment may create sparks that can start fires around dry vegetation. A spark arrestor may be required. The operator should contact local fire agencies for laws or regulations relating to fire prevention requirements.
4. Set up and use only on a flat, level, well-ventilated surface.

5. Wear ANSI-approved safety goggles, heavy-duty work gloves, and dust mask/respirator during set up.

6. Use only lubricants and fuel recommended in the Specifications chart of this manual.

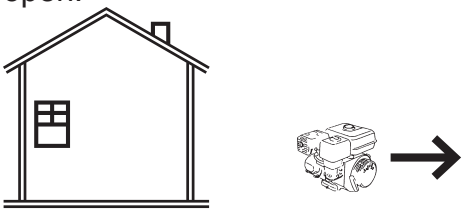
## OPERATING PRECAUTIONS

1.

**CARBON MONOXIDE HAZARD**
**Using an engine indoors CAN KILL YOU IN MINUTES.**

Engine exhaust contains carbon monoxide. This is a poison you cannot see or smell.

NEVER use inside a home or garage, EVEN IF doors and windows are open.



Only use OUTSIDE and far away from windows, doors, and vents.

2. Keep children away from the equipment, especially while it is operating.

3. Keep all spectators <u>at least six feet</u> from the Engine during operation.

4. **Fire Hazard!** Do not fill gas tank while engine is running. Do not operate if gasoline has been spilled. Clean spilled gasoline before starting engine. Do not operate near pilot light or open flame.

5. Do not touch engine during use. Let engine cool down after use.

6. Never store fuel or other flammable materials near the engine.

7. Only use a suitable means of transport and lifting devices with sufficient weight bearing capacity when transporting the Engine.

8. Only use sturdy loading ramps with sufficient weight bearing capacity. Secure the Engine on transport vehicles to prevent the tool from rolling, slipping, and tilting.

9. Industrial applications must follow OSHA requirements.

10. Do not leave the equipment unattended when it is running. Turn off the equipment (and remove safety keys, if available) before leaving the work area.

11. Engine can produce high noise levels. Prolonged exposure to noise levels above 85 dBA is hazardous to hearing. Always wear ear protection when operating or working around the gas engine while it is operating.

12. Wear ANSI-approved safety glasses, hearing protection, and NIOSH-approved dust mask/respirator under a full face shield along with steel-toed work boots during use.

13. People with pacemakers should consult their physician(s) before use. Electromagnetic fields in close proximity to a heart pacemaker could cause pacemaker interference or pacemaker failure. Caution is neces-

sary when near the engine's magneto or recoil starter.

14. Use only accessories that are recommended by Harbor Freight Tools for your model. Accessories that may be suitable for one piece of equipment may become hazardous when used on another piece of equipment.

15. Do not operate in explosive atmospheres, such as in the presence of flammable liquids, gases, or dust. Gasoline-powered engines may ignite the dust or fumes.

16. Stay alert, watch what you are doing and use common sense when operating this piece of equipment. Do not use this piece of equipment while tired or under the influence of drugs, alcohol or medication.

17. Do not overreach. Keep proper footing and balance at all times. This enables better control of the equipment in unexpected situations.

18. Use this equipment with both hands only. Using equipment with only one hand can easily result in loss of control.

19. Keep hands and feet away from moving parts. Do not reach over or across equipment while operating.

20. Dress properly. Do not wear loose clothing or jewelry. Keep hair, clothing and gloves away from moving parts. Loose clothes, jewelry or long hair can be caught in moving parts.

21. Parts, especially exhaust system components, get very hot during use. Stay clear of hot parts.

22. Do not cover the engine or equipment during operation.

23. Keep the equipment, engine, and surrounding area clean at all times.

24. Use the equipment, accessories, etc., in accordance with these instructions and in the manner intended for the particular type of equipment, taking into account the working conditions and the work to be performed. Use of the equipment for operations different from those intended could result in a hazardous situation.

25. Do not operate the equipment with known leaks in the engine's fuel system.

26. This product contains or, when used, produces a chemical known to the State of California to cause cancer and birth defects or other reproductive harm. (California Health & Safety Code § 25249.5, *et seq.*)

27. When spills of fuel or oil occur, they must be cleaned up immediately. Dispose of fluids and cleaning materials as per any local, state, or federal codes and regulations. Store oil rags in a bottom-ventilated, covered, metal container.

28. Before use, check for misalignment or binding of moving parts, breakage of parts, and any other condition that may affect the equipment's operation. **If damaged, have the equipment serviced before using.** Many accidents are caused by poorly maintained equipment.

29. Use the correct equipment for the application. Do not modify the equipment and do not use the equipment

for a purpose for which it is not intended.

## SERVICE PRECAUTIONS

1. **Before service, maintenance, or cleaning:**
   a. **Remove the Ignition Key and close the Fuel Valve.**
   b. **Allow the engine to cool completely.**
   c. **Then, remove the spark plug wire(s) from the spark plug(s).**
2. Keep all safety guards in place and in proper working order. Safety guards include muffler, air cleaner, mechanical guards, and heat shields, among other guards.
3. **Do not alter or adjust any part of the engine that is sealed by the manufacturer or distributor. Only a qualified service technician may adjust parts that may increase or decrease governed engine speed.**
4. Wear ANSI-approved safety goggles, heavy-duty work gloves, and dust mask/respirator during service.
5. Maintain labels and nameplates on the equipment. These carry important information. If unreadable or missing, contact Harbor Freight Tools for a replacement.
6. Have the equipment serviced by a qualified repair person using only identical replacement parts. This will ensure that the safety of the equipment is maintained. Do not attempt any service or maintenance procedures not explained in this manual or any procedures that you are uncertain about your ability to perform safely or correctly.
7. Store equipment out of the reach of children.
8. Follow scheduled engine and equipment maintenance.

**Refueling:**

1. Do not smoke, or allow sparks, flames, or other sources of ignition around the equipment, especially when refuelling.
2. Do not refill the fuel tank while the engine is running or hot.
3. Do not fill fuel tank to the top. Leave a little room for the fuel to expand as needed.
4. Refuel in a well-ventilated area only.
5. Wipe up any spilled fuel and allow excess to evaporate before starting engine. **To prevent FIRE, do not start the engine while the smell of fuel hangs in the air.**

**SAVE THESE INSTRUCTIONS.**

# TECHNICAL SPECIFICATIONS

| | | |
|---|---|---|
| Engine Type | | 13 HP Horizontal Single Cylinder 4 stroke |
| Cooling System | | Forced air cooled |
| Bore x Stroke | | 88mm x 64mm |
| Displacement | | 389cc |
| Compression Ratio | | 8.0:1 |
| Rotation viewed from PTO (power takeoff - the output shaft) | | Counterclockwise |
| Shaft Size | | Ø 1" x 2-7/8" Long<br>1/4" Keyway<br>3/8"-24 UNF inner thread |
| Fuel | Type | 89+ octane unleaded gasoline |
| Engine Oil | Type SAE | 10W30 above 32° F<br>5W30 at 32° F or below |
| | Capacity | 0.63 Quarts |
| Spark Plug | Type | BPR6ES (NGK), F7TC |
| | Gap | 0.7~ 0.8mm |
| Valve Clearance | Intake | 0.15 ± 0.02 mm |
| | Exhaust | 0.20 ± 0.02 mm |
| Idle Speed | | 1,500 ± 150 RPM |

**EPA Only Model:** The emission control system for this Engine is warranted for standards set by the U.S. Environmental Protection Agency. For warranty information, refer to the last pages of this manual.

**EPA/CARB Model:** The emission control system for this Generator's Engine is warranted for standards set by the U.S. Environmental Protection Agency and by the California Air Resources Board (also known as CARB). For warranty information, refer to the last pages of this manual.

At high altitudes, the engine's carburetor, governor (if so equipped), and any other parts that control the fuel-air ratio will need to be adjusted by a qualified mechanic to allow efficient high-altitude use and to prevent damage to the engine and any other devices used with this product.

# UNPACKING

When unpacking, make sure that the item is intact and undamaged. If any parts are missing or broken, please call Harbor Freight Tools at 1-800-444-3353 as soon as possible.

## SET UP INSTRUCTIONS

**Read the ENTIRE IMPORTANT SAFETY INFORMATION section at the beginning of this manual including all text under subheadings therein before set up or use of this product.**

**⚠WARNING** **Risk of accidental starting; resulting in serious personal injury. Remove the Ignition Key, close the Fuel Valve, wait for the engine to cool, and unplug the spark plug wire(s) before assembling or making any adjustments to the equipment.**

**⚠WARNING** **TO PREVENT SERIOUS INJURY:**

**Operate only with proper spark arrestor installed.**

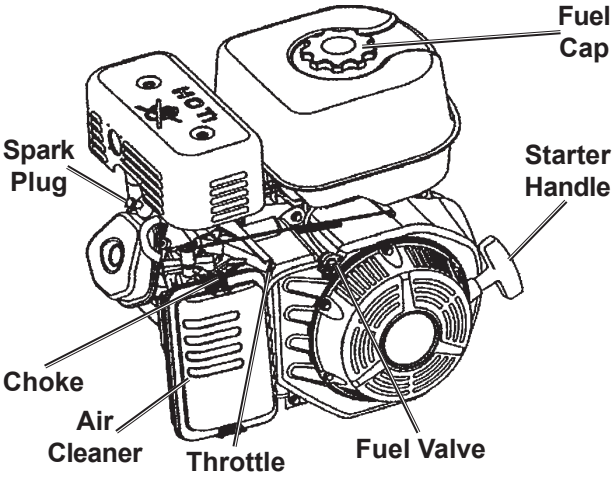
**Operation of this equipment may create sparks that can start fires around dry vegetation.**
**A spark arrestor may be required.**
**The operator should contact local fire agencies for laws or regulations relating to fire prevention requirements.**

**Note:** For additional information regarding the parts listed in the following pages, refer to the Parts Lists and Diagrams near the end of this manual.

## OPERATING INSTRUCTIONS

**Read the ENTIRE IMPORTANT SAFETY INFORMATION section at the beginning of this manual including all text under subheadings therein before set up or use of this product.**

### Primary Engine Components




**Throttle:** Move left to open and increase engine speed or move right to close and decrease engine speed. Idle speed is the engine speed when the throttle is closed.

**Choke:** Move left to close choke (for cold starting), move right to open it (for running).

**Fuel Valve:** Turn clockwise to close fuel valve, turn counterclockwise to open fuel valve.

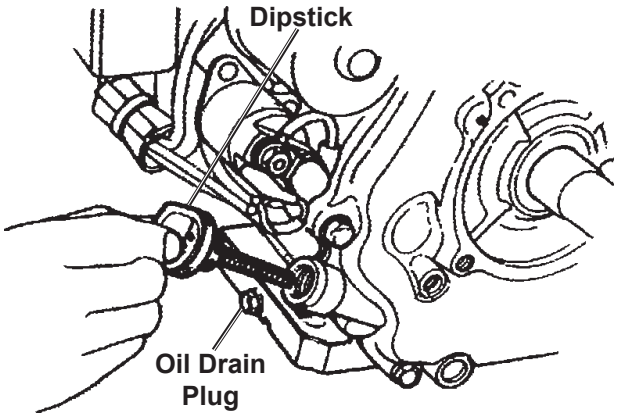
## Pre-Start Checks

**Inspect engine and equipment looking for damaged, loose, and missing parts before set up and starting. If any problems are found, do not use equipment until fixed properly.**

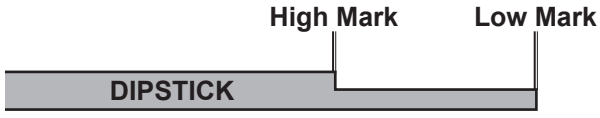
### Checking and Filling Engine Oil

**CAUTION** **Your Warranty is VOID if the engine's crankcase is not properly filled with oil before each use. Before each use, check the oil level. Do not run the engine with low or no engine oil. Running the engine with no or low engine oil WILL permanently damage the engine.**

1. Remove the Ignition Key and close the Fuel Valve.




2. Clean the top of the Dipstick and the area around it. Remove the Dipstick by threading it counterclockwise, and wipe it off with a clean rag.




3. Reinsert the Dipstick without threading it in and remove it to check the oil level. The oil level should be between the high and low marks on the Dipstick.

4. If the oil level is below the end of the dipstick add the appropriate type of oil until the oil level is between the high and the low marks.

   **Oil type:**

   above 32° F = SAE 10W-30

   32° F or below = SAE 5W-30

5. Replace the Dipstick by threading it clockwise.

**CAUTION!** Do not run the engine with too little or too much oil. The engine will be permanently damaged.

### Checking Fuel Level

1.

   **⚠WARNING! TO PREVENT SERIOUS INJURY FROM FIRE:**
   **Fill the fuel tank in a well-ventilated area away from ignition sources. If the engine is hot from use, shut the engine off and wait for it to cool before adding fuel. Do not smoke.**

2. Clean the Fuel Cap and the area around it.

3. Unscrew and remove the Fuel Cap.

4. If needed, fill the Fuel Tank up to the base of the fill neck, but not above, with 89 octane or better unleaded gasoline.

5. Replace the Fuel Cap.

6. Wipe up any spilled fuel and allow excess to evaporate before starting engine. **To prevent FIRE, do not start the engine while the smell of fuel hangs in the air.**

## Starting the Engine

### Start Procedure

**Before starting the engine:**

a. **Follow the Set Up Instructions to prepare the equipment.**

b. **Inspect the equipment and engine.**

c. **Fill the engine with the proper amount and type of both fuel and oil.**

d. **Read the Equipment Operation section that follows.**

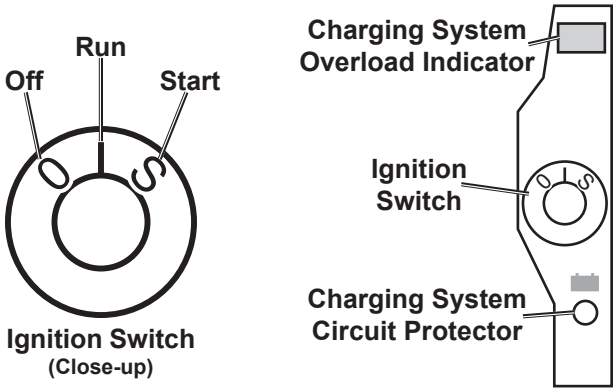
1. Open the Fuel Valve.

2. Close the Throttle.

3. To start a cold engine, close the Choke. To re-start a warm engine, leave the Choke open.

4. Certain pieces of equipment, such as air compressors, may need to have the pressure relieved to allow proper engine starting. Consult equipment manual and open the pilot valve if equipped.

**Starter Control Panel**




5a. To start the engine using the electric starter:
Insert the ignition key into the ignition and turn it to Start (S position) for up to 5 seconds.
**Note:** To prolong starter life, use short starting cycles (5 seconds maximum). Then wait one minute before attempting to start again.

5b. To start the engine manually:
Insert the ignition key into the Ignition and turn the Key to Run (I position). Grasp the starter handle, and pull slowly until resistance is felt. While holding the handle, allow the starter rope to rewind slowly. Then, pull the starter handle with a rapid, full arm stroke. Once again while holding the handle, allow the rope to rewind slowly. Repeat as necessary, until the engine starts.

6. Allow the Engine to run for several seconds. Then, if the Choke is closed, open it.

**Note:** Moving the Choke too fast could kill the engine.

7. IMPORTANT: Allow the engine to run at no load for five minutes with no load after each start-up so that the engine can stabilize.

8. Close the pilot valve on the equipment (if equipped). Adjust the Throttle as needed.

### Break-in Period

1. Breaking-in the engine will help to ensure proper equipment and engine operation.

2. The operational break-in period will last about 3 hours of use. During this period:

   • Do not apply a heavy load to the equipment.

- Do not operate the engine at its maximum speed.

3. The maintenance break-in period will last about 20 hours of use. After this period:

   - Change the engine oil.

   Under normal operating conditions subsequent maintenance follows the schedule explained in the SERVICING section.

## Charging System Circuit Protector

1. If the Charging System Overload Indicator lights, it means that the battery is not charging correctly.
2. Possible issues include:
   a. A short in the battery charging circuit.
   b. Incorrect battery connection.
   c. Faulty battery.
   d. Charging System Circuit Protector is tripped.
3. To prevent battery drain, have a qualified technician repair the problem as soon as possible.
4. After diagnosing and repairing any issues, push the Charging System Circuit Protector to allow the battery to charge again.

## To Stop The Engine

1. Close the Throttle.
2. Turn the Ignition Key to off (0 position) and remove it.
3. Close the Fuel Valve.

# SERVICING

**⚠WARNING** **Risk of serious personal injury from accidental starting. Remove the Ignition Key, close the Fuel Valve, wait for the engine to cool, and unplug the spark plug wire(s) before performing any inspection, maintenance, or cleaning procedures.**

**Damaged equipment can fail, causing serious personal injury. Do not use damaged equipment. If abnormal noise, vibration, or excess smoking occurs, have the problem corrected before further use.**

## Maintenance Procedures

**Many maintenance procedures, including any not detailed in this manual, will need to be performed by a qualified technician for safety. If you have any doubts about your ability to safely service the equipment or engine, have a qualified technician service the equipment instead.**

### Engine Oil Change

⚠**CAUTION!** Oil is very hot during operation and can cause burns. Wait for engine to cool before changing oil.

1. Place a drain pan (not included) underneath the crankcase's drain plug.
2. Remove the drain plug and, if possible, tilt the crankcase slightly to help drain the oil out. Recycle used oil.
3. Replace the drain plug and tighten it.
4. Refill the oil to the proper level following the instructions under the Checking the Oil Level section on page 9 of this manual.

### Air Filter Element Maintenance

1. Remove the air filter cover and the air filter elements and check for dirt. Clean as described below, or replace if necessary.
2. **Cleaning:**
   - For "paper" filter elements: To prevent injury from dust and debris, wear ANSI-approved safety goggles, NIOSH-approved dust mask/respirator, and heavy-duty work gloves. In a well-ventilated area away from bystanders, use pressurized air to blow dust out of the air filter. If this does not get the filter reasonably clean, replace it.
   - For foam filter elements: Wash the element in warm water and mild detergent several times. Rinse. Squeeze out excess water and allow it to dry completely. Soak the filter in lightweight oil briefly, then squeeze out the excess oil.
3. Install the new filter or the cleaned filter. Secure the Air Cleaner Cover before use.

### Spark Plug Maintenance

1. Disconnect spark plug wire from end of plug. Clean out debris from around spark plug.
2. Using a spark plug wrench, remove the spark plug.

3. Inspect the spark plug:
   If the electrode is oily, clean it using a clean, dry rag.
   If the electrode has deposits on it, polish it using emery paper.
   If the white insulator is cracked or chipped, the spark plug needs to be replaced.

4. When installing a new spark plug, adjust the plug's gap to the specification on the Technical Specifications chart. Do not pry against the electrode, the spark plug can be damaged.

5. Install the new spark plug or the cleaned spark plug into the engine.
   Gasket-style: Finger-tighten until the gasket contacts the cylinder head, then about 1/2-2/3 turn more.
   Non-gasket-style: Finger-tighten until the plug contacts the head, then about 1/16 turn more.

6. Apply a small amount of dielectric grease (not included) to the insulator of the spark plug and attach the wire securely to the spark plug.

**Fuel Filter Replacement**

⚠**WARNING! RISK OF FIRE OR EXPLOSION.** Replace the fuel filter in a well-ventilated area away from ignition sources. Do not smoke.

1. Wait for engine to cool completely before proceeding.

2. Wear protective gear including, ANSI-approved safety goggles, NIOSH-approved dust mask/respirator, and nitrile gloves.

3. Use a hose pinch pliers (not supplied) to pinch the hose just above the fuel filter (be aware of fuel inlet and outlet nozzles).

4. Remove pipe clamps from both ends of the fuel filter. Take note of the fuel filter's orientation. Twist off filter from hoses. Allow fuel to drain onto the container.

5. Install new fuel filter in the same orientation. Make sure to properly secure both fuel lines. Remove hose pinch pliers.

6. Inspect hoses for damage and replace if needed.

7. Clean up and properly dispose of all fuel.

8. Wait for at least one hour before use to allow all residual fuel vapors to dissipate. **To prevent FIRE, do not start the engine while the smell of fuel hangs in the air.** Open the fuel valve before restarting the engine. It may take a little longer than usual to start the engine because the fuel needs to refill the fuel line and new filter.

## Cleaning, Maintenance, and Lubrication Schedule

**Note:** This maintenance schedule is intended solely as a general guide. If performance decreases or if equipment operates unusually, check systems immediately. The maintenance needs of each piece of equipment will differ depending on factors such as duty cycle, temperature, air quality, fuel quality, and other factors.

**Before Each Use:**

a. Check engine oil level.

b. Check air cleaner.

**Note:** The following procedures are in addition to the regular checks and maintenance explained as part of the regular operation of the engine and equipment.

**After First Month or 25 Operation Hour Break-in Period:**

a. Change engine oil.

b. Check Float Chamber for sediment, clean if needed.

**After Every 3 Months or 50 Operation Hours:**

Clean or replace air cleaner.*

**After Every 6 Months or 100 Operation Hours:**

a. Change engine oil.

b. Check and clean spark plug.

c. Service/replace spark arrestor.**

**After Every Year or 300 Operation Hours:**

a. Check/adjust idle speed.**

b. Check/adjust valve clearance.**

c. Clean carburetor.

d. Clean fuel tank and strainer.**

e. Clean carbon build-up from combustion chamber.

**After Every 2 years:**

Replace fuel line if necessary.**

**Note:** All maintenance procedures scheduled for 25, 50, and 100 operation hours should be performed at least yearly.

* Service more frequently when used in dusty areas.

** These items should be serviced by a qualified service technician.

## Storage

1. Wait for engine to cool, then clean engine with clean cloth.

2. When the equipment is to remain idle for longer than 20 days, prepare the engine for storage as follows:

   a. Change engine oil and empty fuel tank.

   b. Either leave fuel tank empty or refill fuel tank with fresh unleaded gasoline mixed with a fuel stabilizer intended for long term engine storage (not included). After filling, run engine for about 5-10 minutes to circulate the treated gasoline through the carburetor. Wait for engine to cool before proceeding.

   c. Clean out area around spark plug. Remove spark plug and pour one

tablespoon of engine oil into cylinder through spark plug hole.

d. Replace spark plug, but leave spark plug wire disconnected.

e. Pull Starter Handle to distribute oil in cylinder. Pull engine through one or two revolutions. Stop when you feel the piston start the compression stroke (when you start to feel resistance).

f. Disconnect battery cables (if equipped).

3. Apply a thin coat of rust preventive oil to all metal parts.

4. Cover and store in a dry, well-ventilated area out of reach of children.

5. Before starting the engine after storage, keep in mind that untreated gasoline will deteriorate quickly. Drain the fuel tank and change to fresh fuel if untreated gasoline has been sitting for a month, if treated gasoline has been sitting beyond the fuel stabilizer's recommended time period, or if the engine does not start properly.

# Troubleshooting

| Problem | Possible Causes | Probable Solutions |
|---|---|---|
| Engine will not start | FUEL RELATED: | FUEL RELATED: |
| | 1. No fuel in tank or fuel valve closed. | 1. Fill fuel tank and open fuel valve. |
| | 2. Choke not closed. | 2. Close choke if engine cold. |
| | 3. Low quality or deteriorated, old gasoline. | 3. Use only fresh 89+ octane unleaded gasoline. |
| | 4. Carburetor not primed. | 4. Pull on Starter Handle to prime. |
| | 5. Dirty fuel passageways blocking fuel flow. | 5. Clean out passageways using fuel additive. Heavy deposits may require further cleaning. |
| | 6. Carburetor needle stuck. Fuel can be smelled in the air. | 6. **Gently** tap side of carburetor float chamber with screwdriver handle. |
| | 7. Too much fuel in chamber. This can be caused by the carburetor needle sticking. | 7. Open Choke. Remove spark plug and pull the start handle several times to air out the chamber. Reinstall spark plug and close Choke. |
| | 8. Clogged Fuel Filter. | 8. Replace Fuel Filter. |
| | IGNITION (SPARK) RELATED: | IGNITION (SPARK) RELATED: |
| | 1. Spark plug wire not connected securely. | 1. Connect spark plug wire properly. |
| | 2. Spark plug electrode wet or dirty. | 2. Clean spark plug. |
| | 3. Incorrect spark plug gap. | 3. Correct spark plug gap. |
| | 4. Spark plug wire broken. | 4. Replace spark plug wire. |
| | 5. Incorrect spark timing or faulty ignition system. | 5. Have qualified technician diagnose/ repair ignition system. |
| | COMPRESSION RELATED: | COMPRESSION RELATED: |
| | 1. Cylinder not lubricated. Problem after long storage periods. | 1. Pour tablespoon of oil into spark plug hole. Crank engine a few times and try to start again. |
| | 2. Loose or broken spark plug. (Hissing noise will occur when trying to start.) | 2. Tighten spark plug. If that does not work, replace spark plug. If problem persists, may have head gasket problem, see #3 to the left. |
| | 3. Loose cylinder head or damaged head gasket. (Hissing noise will occur when trying to start.) | 3. Tighten head. If that does not remedy problem, replace head gasket. |
| | 4. Engine valves or tappets mis-adjusted or stuck. | 4. Have qualified technician diagnose/ repair ignition system. |

**Follow all safety precautions whenever diagnosing or servicing the equipment or engine.**

# Troubleshooting

| Problem | Possible Causes | Probable Solutions |
|---|---|---|
| Engine misfires | 1. Spark plug wire loose.<br>2. Incorrect spark plug gap or damaged spark plug.<br>3. Defective spark plug wire.<br>4. Old or low quality gasoline.<br>5. Incorrect compression. | 1. Check wire connections.<br>2. Re-gap or replace spark plug.<br>3. Replace spark plug wire.<br>4. Use only fresh 89+ octane unleaded gasoline.<br>5. Diagnose and repair compression. (Use **Engine will not start: COMPRESSION RELATED** section.) |
| Engine stops suddenly | 1. Low oil shutdown.<br>2. Fuel tank empty or full of impure or low quality gasoline.<br>3. Defective fuel tank cap creating vacuum, preventing proper fuel flow.<br>4. Faulty magneto.<br>5. Clogged Fuel Filter | 1. Fill engine oil to proper level. Check engine oil before EVERY use.<br>2. Fill fuel tank with fresh 89+ octane unleaded gasoline.<br>3. Test/replace fuel tank cap.<br>4. Have qualified technician service magneto.<br>5. Replace Fuel Filter. |
| Engine stops when under heavy load | 1. Dirty air filter.<br>2. Clogged Fuel Filter.<br>3. Engine running cold. | 1. Clean or replace element.<br>2. Replace Fuel Filter.<br>3. Allow engine to warm up prior to operating equipment. |
| Engine knocks | 1. Old or low quality gasoline.<br>2. Engine overloaded.<br>3. Incorrect spark timing, deposit buildup, worn engine, or other mechanical problems. | 1. Fill fuel tank with fresh 89+ octane unleaded gasoline.<br>2. Do not exceed equipment's load rating.<br>3. Have qualified technician diagnose and service engine. |
| Engine backfires | 1. Impure or low quality gasoline.<br>2. Engine too cold.<br>3. Intake valve stuck or overheated engine. | 1. Fill fuel tank with fresh 89+ octane unleaded gasoline.<br>2. Use cold weather fuel and oil additives to prevent backfiring.<br>3. Have qualified technician diagnose and service engine. |

**Follow all safety precautions whenever diagnosing or servicing the equipment or engine.**

# PARTS LIST

| Part | Description | Qty |
|---|---|---|
| 1 | Washer | 2 |
| 2 | Drain plug | 2 |
| 3 | Oil seal, crankshaft | 1 |
| 4 | Seal | 1 |
| 5 | Diode | 1 |
| 6 | Crankcase | 1 |
| 7 | Oil seal, regulating sway bar | 1 |
| 8 | Washer | 1 |
| 9 | Split pin | 1 |
| 10 | Regulating sway bar | 1 |
| 11 | Bolt M6×14 | 2 |
| 12 | Oil sensor | 1 |
| 13 | Piston ring set | 1 |
| 14 | Piston pin circlip | 2 |
| 15 | Piston | 1 |
| 16 | Piston pin | 1 |
| 17 | Connecting rod assy | 1 |
| 18 | Woodruff key | 1 |
| 19 | Bearing 6206 | 1 |
| 20 | Crankshaft assy | 1 |
| 21 | Oil plug with Seal | 1 |
| 22 | Oil plug | 1 |
| 23 | Seal | 2 |
| 24 | Crankcase cover | 1 |
| 25 | Driven gear, regulator assy | 1 |
| 26 | Gasket, crankcase | 1 |
| 27 | Set pin | 2 |
| 28 | Dipstick | 1 |
| 29 | Dipstick with seal | 1 |
| 30 | Bearing 6206 | 1 |
| 31 | Oil seal, crankshaft | 1 |
| 32 | Bolt M8×35 | 7 |
| 33 | Nut M8 | 2 |
| 34 | Exhaust pipe | 1 |
| 35 | Exhaust pipe gasket | 1 |
| 36 | Muffler gasket | 1 |
| 37 | Muffler assy | 1 |
| 38 | Bolt | 1 |
| 39 | Cylinder head cover Assy | 1 |
| 40 | Gasket, cylinder head cover | 1 |
| 41 | Bolt | 4 |
| 42 | Lead wind cover | 1 |
| 43 | Stud | 2 |
| 44 | Gasket, cylinder head | 1 |
| 45 | Set pin | 2 |
| 46 | Cylinder head Assy | 1 |
| 47 | Spark plug F7RTCU | 1 |
| 48 | Stud | 2 |
| 49 | Air duct | 1 |
| 50 | Seal | 1 |

| Part | Description | Qty |
|---|---|---|
| 51 | Nut M6 | 2 |
| 52 | Air cleaner | 1 |
| 53 | Inlet gasket | 1 |
| 54 | Connecting block | 1 |
| 55 | Carburetor gasket | 1 |
| 56 | Air cleaner gasket | 1 |
| 57 | Carburetor Assy | 1 |
| 58 | Fan hood assy | 1 |
| 59 | Bolt M6×12 | 5 |
| 60 | Engine switch | 1 |
| 61 | Wire grommet | 1 |
| 62 | Clip | 1 |
| 63 | Plastic clip | 1 |
| 64 | Bolt M6×8 | 3 |
| 65 | Recoil starter assy | 1 |
| 66 | Nut M16×1.25 | 1 |
| 67 | Starting flange | 1 |
| 68 | Flywheel fan | 1 |
| 69 | Flywheel | 1 |
| 70 | Screw M6×25 | 2 |
| 71 | Engine stop cable | 1 |
| 72 | Ignition coil | 1 |
| 73 | Spark plug cap | 1 |
| 74 | Ignition coil assy | 1 |
| 75 | Pipe | 1 |
| 76 | Outlet pipe (EPA qty 1) | 2 |
| 77 | Pipe clamp (EPA qty 2) | 4 |
| 78 | Connector (EPA qty 1) | 2 |
| 79 | Bolt M8×25 | 2 |
| 80 | Nut M8 | 2 |
| 81 | Fuel tank | 1 |
| 82 | Filter cup | 1 |
| 83a | Fuel cap (EPA+CARB version) | 1 |
| 83b | Fuel cap (EPA only version) | 1 |
| 84 | Regulating frame assy | 1 |
| 85 | Back spring | 1 |
| 86 | Lock bolt | 1 |
| 87 | Regulating arm | 1 |
| 88 | Nut M6 | 2 |
| 89 | Fine regulating spring | 1 |
| 90 | Pulling rod | 1 |
| 91 | Lock nut | 2 |
| 92 | Sleeve | 2 |
| 93 | Valve rocker | 2 |
| 94 | Adjusting bolt for valve gap | 2 |
| 95 | Pusher guide | 1 |
| 96 | Pusher | 2 |
| 97 | Tappet | 2 |
| 98 | Camshaft assy | 1 |
| 99 | Exhaust valve | 1 |

**Note:** Some parts are listed and shown for illustration purposes only, and are not available individually as replacement parts.

## Parts List (continued)

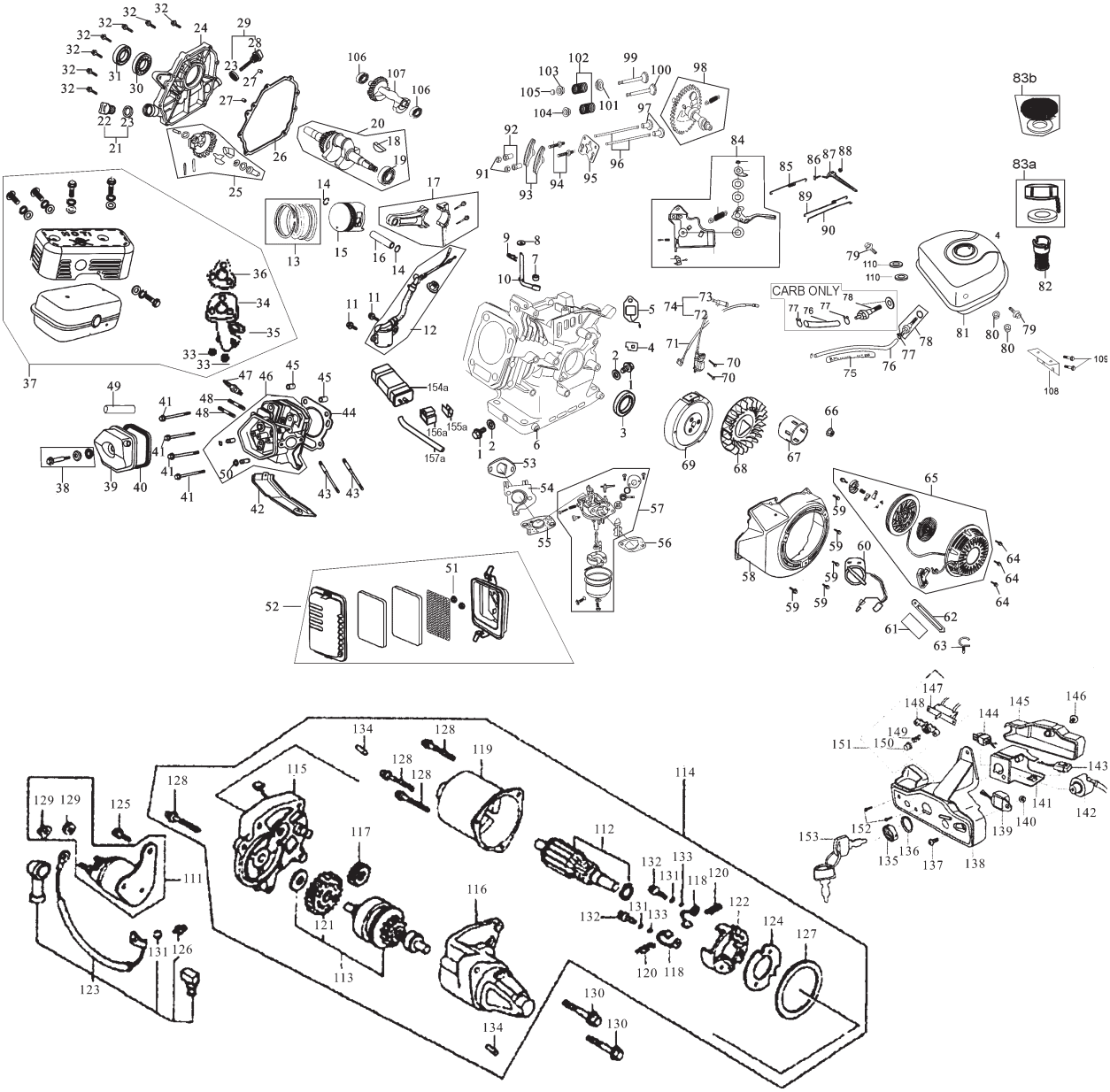
| Part | Description | Qty |
|---|---|---|
| 100 | Intake valve | 1 |
| 101 | Spring retainer, exhaust valve | 1 |
| 102 | Valve spring | 2 |
| 103 | Spring seat, exhaust valve | 1 |
| 104 | Spring seat, intake valve | 1 |
| 105 | Cap | 1 |
| 106 | Bearing 6202 | 2 |
| 107 | Balancing shaft | 1 |
| 108 | Fuel tank connect | 1 |
| 109 | Bolt M8×20 | 2 |
| 110 | Fuel tank shock pad | 2 |
| 111 | Relay, Start-Up | 1 |
| 112 | Rotor Comp | 1 |
| 113 | Starting Clutch | 1 |
| 114 | Starter Motor Assy. | 1 |
| 115 | Base, Starter | 1 |
| 116 | Housing, Starter Clutch | 1 |
| 117 | Drive Gear | 1 |
| 118 | Brush, Comp. | 4 |
| 119 | Stator Assy. | 1 |
| 120 | Spring, Brush | 4 |
| 121 | Reducing Gear | 1 |
| 122 | Stay, Brush | 1 |
| 123 | Cable, Starter Motor | 1 |
| 124 | Insulator | 1 |
| 125 | Bolt (M5x14) | 2 |
| 126 | Screw (M4x6) | 1 |
| 127 | Packing Ring | 1 |
| 128 | Screw (M5x32) | 4 |
| 129 | Nut (M6) | 2 |

| Part | Description | Qty |
|---|---|---|
| 130 | Bolt (M6x35) | 2 |
| 131 | Spring Washer (4mm) | 3 |
| 132 | Screw (M4x14) | 2 |
| 133 | Washer (4mm) | 2 |
| 134 | Set Pin (8x14) | 2 |
| 135 | Clamp Ring | 1 |
| 136 | Gasket | 1 |
| 137 | Bolt (M4x10) | 1 |
| 138 | Control Front Cover | 1 |
| 139 | Diode | 1 |
| 140 | Nut (M4) | 1 |
| 141 | Fixed Mount | 1 |
| 142 | Ignition Switch | 1 |
| 143 | Safety | 1 |
| 144 | Diode Assy. | 1 |
| 145 | Control Rear Cover | 1 |
| 146 | Attachment Bolt | 1 |
| 147 | Protector | 1 |
| 148 | Fixed Mount | 1 |
| 149 | Spring | 1 |
| 150 | Cover | 1 |
| 151 | Protector Assy. | 1 |
| 152 | Bolt (M3x12) | 2 |
| 153 | Ignition Key | 1 |
| 154a | Secondary filling valve (CARB only) | 1 |
| 155a | Bracket (CARB only) | 1 |
| 156a | Carbon irrigation connector (CARB only) | 1 |
| 157a | Fuel pipe (CARB only) | 1 |

## PLEASE READ THE FOLLOWING CAREFULLY

THE MANUFACTURER AND/OR DISTRIBUTOR HAS PROVIDED THE PARTS LIST AND ASSEMBLY DIAGRAM IN THIS MANUAL AS A REFERENCE TOOL ONLY. NEITHER THE MANUFACTURER OR DISTRIBUTOR MAKES ANY REPRESENTATION OR WARRANTY OF ANY KIND TO THE BUYER THAT HE OR SHE IS QUALIFIED TO MAKE ANY REPAIRS TO THE PRODUCT, OR THAT HE OR SHE IS QUALIFIED TO REPLACE ANY PARTS OF THE PRODUCT. IN FACT, THE MANUFACTURER AND/OR DISTRIBUTOR EXPRESSLY STATES THAT ALL REPAIRS AND PARTS REPLACEMENTS SHOULD BE UNDERTAKEN BY CERTIFIED AND LICENSED TECHNICIANS, AND NOT BY THE BUYER. THE BUYER ASSUMES ALL RISK AND LIABILITY ARISING OUT OF HIS OR HER REPAIRS TO THE ORIGINAL PRODUCT OR REPLACEMENT PARTS THERETO, OR ARISING OUT OF HIS OR HER INSTALLATION OF REPLACEMENT PARTS THERETO.

# ASSEMBLY DIAGRAM



# LIMITED 90 DAY WARRANTY

Harbor Freight Tools Co. makes every effort to assure that its products meet high quality and durability standards, and warrants to the original purchaser that this product is free from defects in materials and workmanship for the period of 90 days from the date of purchase. This warranty does not apply to damage due directly or indirectly, to misuse, abuse, negligence or accidents, repairs or alterations outside our facilities, criminal activity, improper installation, normal wear and tear, or to lack of maintenance. We shall in no event be liable for death, injuries to persons or property, or for incidental, contingent, special or consequential damages arising from the use of our product. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation of exclusion may not apply to you. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.

To take advantage of this warranty, the product or part must be returned to us with transportation charges prepaid. Proof of purchase date and an explanation of the complaint must accompany the merchandise. If our inspection verifies the defect, we will either repair or replace the product at our election or we may elect to refund the purchase price if we cannot readily and quickly provide you with a replacement. We will return repaired products at our expense, but if we determine there is no defect, or that the defect resulted from causes not within the scope of our warranty, then you must bear the cost of returning the product.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

***3491 Mission Oaks Blvd. • PO Box 6009 • Camarillo, CA 93011 • (800) 444-3353***

# EMISSION CONTROL SYSTEM WARRANTY

### California and United States Emission Control Defects Warranty Statement (EPA/CARB Model)

The California Air Resources Board (herein CARB), the United States Environmental Protection Agency (herein EPA), and Harbor Freight Tools (herein HFT) are pleased to explain the emission control system warranty on your 1995 and later Small Off-Road Engine (herein engine). In California, the engine must be designed, built and equipped to meet the State's stringent anti-smog standards. Elsewhere within the United States, new off-road, spark-ignition engines certified for model year 1997 and later, must meet similar standards set forth by the EPA. HFT must warrant the emission control system on your engine for the periods of time described below, provided there has been no abuse, neglect or improper maintenance of your engine.

Your emission control system may include parts such as the carburetor or fuel-injection system, and the ignition system. Also included may be hoses, belts, connectors and other emission-related assemblies.

Where a warrantable condition exists, HFT will repair your engine at no cost to you including diagnosis, parts and labor.

### United States Emission Control Defects Warranty Statement (EPA only model)

The United States Environmental Protection Agency (herein EPA) and Harbor Freight Tools (herein HFT) are pleased to explain the emission control system warranty on your 1997 and later Small Off-Road Engine (herein engine). Within the United States, new off-road, spark-ignition engines certified for model year 1997 and later, must be designed, built and equipped to meet the stringent anti-smog standards set forth by the EPA. HFT must warrant the emission control system on your engine for the periods of time described below, provided there has been no abuse, neglect or improper maintenance of your engine.

Your emission control system may include parts such as the carburetor or fuel-injection system, and the ignition system. Also included may be hoses, belts, connectors and other emission-related assemblies.

Where a warrantable condition exists, HFT will repair your engine at no cost to you including diagnosis, parts and labor.

### Manufacturer's Warranty Coverage

The 1997 and later engines are warranted for two (2) years. If any emission-related part on your engine is defective, the part will be repaired or replaced by HFT.

## Harbor Freight Tools Emission Control Defects Warranty Coverage

Engines are warranted for a period of two (2) years relative to emission control parts defects, subject to the provisions set forth below. If any emission related part on your engine is defective, the part will be repaired or replaced by HFT.

### Owner's Warranty Responsibilities

- As the engine owner, you are responsible for the performance of the required maintenance listed in your Owner's Manual. HFT recommends that you retain all receipts covering maintenance on your engine, but HFT cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance.
- As the engine owner, you should, however, be aware that HFT may deny you warranty coverage if your engine or a part has failed due to abuse, neglect, improper maintenance, or unapproved modifications.
- You are responsible for shipping your engine to a HFT warranty station as soon as a problem exists. Contact the HFT Customer Service department at the number below to make shipping arrangements. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days.

If you have any questions regarding your warranty rights and responsibilities, you should contact the Harbor Freight Tools Customer Service Department at 1-800-444-3353.

## Harbor Freight Tools Emission Control Defects Warranty Provisions

### 1. Length of Coverage

HFT warrants to a first retail purchaser and each subsequent purchaser that the engine is free from defects in materials and workmanship that cause the failure of warranted parts for a period of two (2) years after the date of delivery to the first retail purchaser.

### 2. No Charge Repair or Replacement

Repair or replacement of any warranted part will be performed at no charge to the owner if the work is performed through a warranty station authorized by HFT. For emissions warranty service, contact the HFT Customer Service Department at 1-800-444-3353.

### 3. Consequential Damages Coverage

Coverage under this warranty shall also extend to the failure of any engine components caused by the failure of any warranted part while it is still covered under this warranty.

### 4. Coverage Exclusions

Warranty claims shall be filed in accordance with the provisions of the HFT warranty policy explained in the box at the top of the previous page. HFT shall not be liable for any loss of use of the engine, for any alternative usage, for any damage to goods, loss of time, or inconvenience. Warranty coverage shall also be excluded for any part which fails, malfunctions, or is damaged due to failure to follow the maintenance and operating instructions set forth in the Owner's Manual including, but not limited to:

a) Use of parts which are not authorized by HFT

b) Improper installation, adjustment or repair of the engine or of any warranted part unless performed by an authorized warranty center

c) Failure to follow recommendations on fuel use contained in the Owner's Manual

d) Improper or inadequate maintenance of any warranted parts

e) Repairs performed outside of the authorized warranty service dealers

f) Alterations by changing, adding to or removing parts from the engine.

### 5. Service and Maintenance

Component parts which are not scheduled for replacement as required maintenance or are scheduled only for regular inspection to the effect of "repair or replace as necessary" are warranted for the warranty period. Any warranted part which is scheduled for replacement as required maintenance is warranted for the period of time up to the first scheduled replacement point for that part. Any replacement part, provided it is equivalent in durability and performance, may be used in performance of maintenance or repairs. The owner is responsible for commissioning a qualified technician/mechanic to perform all required maintenance, as outlined in the Inspection, Cleaning, and Maintenance section in this manual.

### 6. Warranted Parts

**1) Fuel Metering System**

i) Carburetor and its internal parts.

ii) Fuel pump (if so equipped).

iii) Cold start enrichment system.

**2) Air Induction System**

i) Intake pipe/manifold.

ii) Air cleaner.

**3) Ignition System**

i) Spark plug.

ii) Magneto ignition system.

**4) Catalyst System (if so equipped)**

i) Exhaust pipe stud.

ii) Muffler.

iii) Catalytic converter (if so equipped).

**5) Miscellaneous Items Used in Above Systems**

i) Vacuum, temperature and time sensitive valves and switches.

ii) Hoses, belts, connectors, and assemblies.